



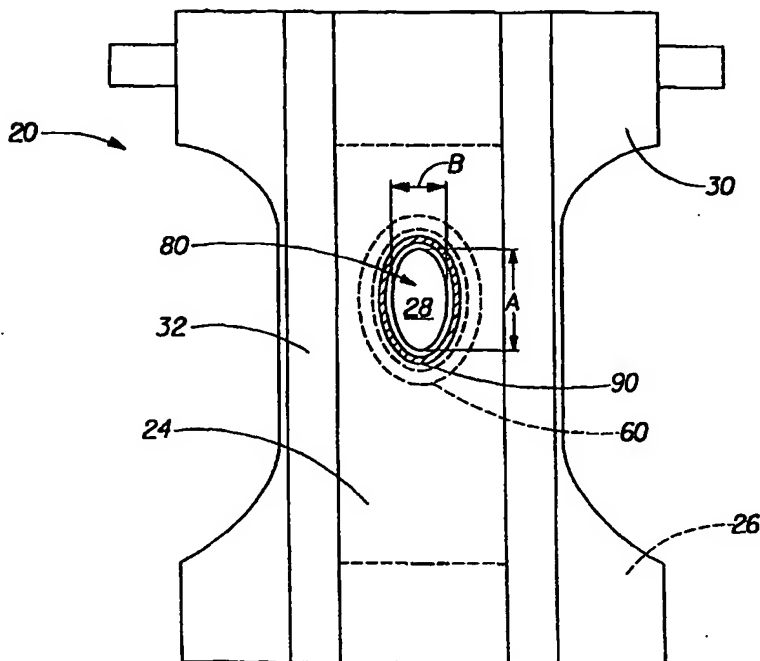
## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification <sup>7</sup> : <b>A61F 13/15, 13/82</b>		A1	(11) International Publication Number: <b>WO 00/24350</b>
			(43) International Publication Date: <b>4 May 2000 (04.05.00)</b>
(21) International Application Number: <b>PCT/US99/24291</b> (22) International Filing Date: <b>18 October 1999 (18.10.99)</b> (30) Priority Data: 09/181,258                      28 October 1998 (28.10.98)                      US (71) Applicant: <b>THE PROCTER &amp; GAMBLE COMPANY</b> [US/US]; One Procter & Gamble Plaza, Cincinnati, OH 45202 (US). (72) Inventors: <b>D'ACCHIOLI, Vincenzo</b> ; Parkstrasse 42, D-65779 Kelkheim (DE). <b>PALUMBO, Gianfranco</b> ; Georgenfeld 7, D-61348 Bad Homburg (DE). <b>ROE, Donald, Carroll</b> ; 6324 Emberwood Court, West Chester, OH 45069 (US). <b>THURNAY, Eva, Susanne, Dominique</b> ; Via M. Castagna 52, I-Pescara 65123 (IT). (74) Agents: <b>REED, T., David et al.</b> ; The Procter & Gamble Company, 5299 Spring Grove Avenue, Cincinnati, OH 45217-1087 (US).		(81) Designated States: AE, AL, AM, AT, AT (Utility model), AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, CZ (Utility model), DE, DE (Utility model), DK, DK (Utility model), DM, EE, EE (Utility model), ES, FI, FI (Utility model), GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SK (Utility model), SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZA, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).  Published With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.	

(54) Title: PERSONAL CARE WITH AN APERTURE ALIGNED BY A SKIN ADHESIVE FOR RECEIVING FECAL MATERIAL

## (57) Abstract

An absorbent article comprises a topsheet including a primary aperture for receiving fecal waste, a backsheet joined with at least a portion of the topsheet, an absorbent core disposed between at least a portion of the topsheet and the backsheet, a spacing member disposed between the topsheet and the backsheet. The spacing member provides a void space into which feces can be directed. The absorbent article preferably also includes a body adhering composition disposed about at least a portion of the primary aperture for adhering the topsheet of the absorbent article to the wearer during use.



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**PERSONAL CARE WITH AN APERTURE ALIGNED BY A SKIN ADHESIVE FOR RECEIVING FECAL MATERIAL**

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**FIELD OF THE INVENTION**

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This invention is directed to hygienic absorbent articles, such as diapers, adult incontinence articles, feminine protection articles and the like.

**BACKGROUND OF THE INVENTION**

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Absorbent articles are well known in the art. These articles typically have an absorbent core, which is held or positioned against the body of the wearer during use by a fastening system, such that the bodily exudates are caught by the article. Typical absorbent articles include a topsheet facing the wearer which permits fluid exudates to pass through and a backsheet which prevents the exudates from escaping from the absorbent article.

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Many advancements have been made in the art since the introduction of the disposable absorbent article. However, problems still exist relating to the acceptance and storage of feces, and especially runny and pasty feces. The problem has been difficult to resolve because feces generally will not pass through a topsheet and thus, remains free to move about in the diaper until the diaper is changed. This often leads to feces escaping the diaper or soiling of the wearer's skin.

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In order to prevent the feces from escaping the diaper or soiling the skin, apertures have been provided in the topsheet which allow the feces to pass to the absorbent core. However, the apertures are difficult to position during application of the diaper and often move from the desired position when the diaper is worn.

5 Thus, it would be desirable to provide absorbent articles with improved fit and sealing which can be sustained during use. It would also be desirable to provide an article which can maintain a desired configuration for accepting and storing body exudates, especially feces. Further, it would be advantageous to provide an article with a topical or body adhesive which helps maintain the article in the desired configuration (e.g., the  
10 aperture is aligned with the anus) without irritating or harming the wearer's skin. Even further, it would also be advantageous to provide a void space for the waste which can be maintained even under applied pressures which are typical of the forces generated by a wearer on the crotch and buttocks region of the article while the wearer is in a seated position.

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### **SUMMARY OF THE INVENTION**

In order to solve one or more of the problems found in the art, an absorbent article, such as an adult incontinence article, baby diaper or feminine hygiene pad, having a void space is provided having a topical adhesive which helps keep the article in a desired  
20 configuration for receiving and storing bodily exudates. Preferably, the absorbent article comprises a topsheet including a primary aperture for receiving fecal waste, a backsheet joined with at least a portion of the topsheet, an absorbent core disposed between at least a portion of the topsheet and the backsheet, a spacing member disposed between the topsheet and the backsheet. The spacing member provides a void space into which feces  
25 can be directed. The absorbent article preferably also includes a body adhering composition disposed about at least a portion of the primary aperture for adhering the topsheet of the absorbent article to the wearer during use.

### **BRIEF DESCRIPTION OF THE DRAWINGS**

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Fig. 1 is a plan view of a disposable diaper.

Fig. 2 is a plan view of a disposable diaper configuration of the present invention.

Fig. 3 is a cross-sectional view of one embodiment of the present invention shown as it may appear when worn.

Fig. 4 is a plan view of a spacing member suitable for use with the present  
5 invention.

Fig. 5 is a cross-sectional view of the spacing member shown in Fig. 4 taken through section line 5-5.

Fig. 6 is a cross-sectional view of one embodiment of the present invention.

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### **DETAILED DESCRIPTION OF THE INVENTION**

As used herein, the term "absorbent article" refers to devices which absorb and contain body exudates, and more specifically, refers to devices which are placed against or in proximity to the body of the wearer to absorb and contain the various exudates discharged from the body. The term "disposable" is used herein to describe absorbent  
15 articles which generally are not intended to be laundered or otherwise restored or reused as an absorbent article (i.e., they are intended to be discarded after a single use and, preferably, to be recycled, composted or otherwise disposed of in an environmentally compatible manner). (As used herein, the term "disposed" is used to mean that an element(s) of the diaper is formed (joined and positioned) in a particular place or position  
20 as a unitary structure with other elements of the diaper or as a separate element joined to another element of the diaper. As used herein, the term "joined" encompasses configurations whereby an element is directly secured to another element by affixing the element directly to the other element, and configurations whereby an element is indirectly secured to another element by affixing the element to intermediate member(s) which in  
25 turn are affixed to the other element.) A "unitary" absorbent article refers to absorbent articles which are formed of separate parts united together to form a coordinated entity so that they do not require separate manipulative parts like a separate holder and liner. A preferred embodiment of an absorbent article of the present invention is the unitary disposable absorbent article, diaper 20, shown in Figure 1. As used herein, the term  
30 "diaper" refers to an absorbent article generally worn by infants and incontinent persons

about the lower torso. The present invention is also applicable to other absorbent articles such as incontinence briefs, incontinence undergarments, absorbent inserts, diaper holders and liners, feminine hygiene garments, wipes, mops, bandages and the like.

Figure 1 is a plan view of the diaper 20 of the present invention in a flat-out, state  
5 with portions of the structure being cut-away to more clearly show the construction of the diaper 20. The portion of the diaper 20 which faces the wearer is oriented towards the viewer. As shown in Figure 1, the diaper 20 preferably comprises a liquid pervious topsheet 24; a liquid impervious backsheet 26; an absorbent core 28, which is preferably positioned between at least a portion of the topsheet 24 and the backsheet 26; side panels  
10 30; elasticized leg cuffs 32; an elastic waist feature 34; and a fastening system generally designated 40. Diaper 20 is shown in Figure 1 to have a first waist region 36, a second waist region 38 opposed to the first waist region 36 and a crotch region 37 located between the first waist region and the second waist region. The periphery of the diaper 20 is defined by the outer edges of the diaper 20 in which the longitudinal edges 50 run  
15 generally parallel to the longitudinal centerline 100 of the diaper 20 and the end edges 52 run between the longitudinal edges 50 generally parallel to the lateral centerline 110 of the diaper 20.

The chassis 22 of the diaper 20 comprises the main body of the diaper 20. The chassis 22 comprises at least a portion of the absorbent core 28 and preferably an outer  
20 covering layer including the topsheet 24 and the backsheet 26. If the absorbent article comprises a separate holder and a liner, the chassis 22 generally comprises the holder and the liner. (For example, the holder may comprise one or more layers of material to form the outer cover of the article and the liner may comprise an absorbent assembly including a topsheet, a backsheet, and an absorbent core. In such cases, the holder and/or the liner  
25 may include a fastening element which is used to hold the liner in place throughout the time of use.) For unitary absorbent articles, the chassis 22 comprises the main structure of the diaper with other features added to form the composite diaper structure. While the topsheet 24, the backsheet 26, and the absorbent core 26 may be assembled in a variety of well known configurations, preferred diaper configurations are described generally in U.S.  
30 Pat. No. 3,860,003 entitled "Contractible Side Portions for Disposable Diaper" which

issued to Kenneth B. Buell on January 14, 1975; U.S. Pat. No. 5,151,092 issued to Buell on September 9, 1992; and U.S. Pat. No. 5,221,274 issued to Buell on June 22, 1993; and U.S. Pat. No. 5,554,145 entitled "Absorbent Article With Multiple Zone Structural Elastic-Like Film Web Extensible Waist Feature" which issued to Roe et al. on  
5 September 10, 1996; U.S. Pat. No. 5,569,234 entitled "Disposable Pull-On Pant" which issued to Buell et al. on October 29, 1996; U.S. Pat. No. 5,580,411 entitled "Zero Scrap Method For Manufacturing Side Panels For Absorbent Articles" which issued to Nease et al. on December 3, 1996; and U.S. Patent Application Serial No. 08/915,471 entitled "Absorbent Article With Multi-Directional Extensible Side Panels" filed August 20, 1997  
10 in the name of Robles et al.; each of which is incorporated herein by reference.

The backsheet 26 is generally that portion of the diaper 20 positioned adjacent the garment facing surface of the absorbent core 28 which prevents the exudates absorbed and contained therein from soiling articles which may contact the diaper 20, such as bedsheets and undergarments. In preferred embodiments, the backsheet 26 is impervious to liquids  
15 (e.g., urine) and comprises a thin plastic film such as a thermoplastic film having a thickness of about 0.012 mm (0.5 mil) to about 0.051 mm (2.0 mils). Suitable backsheet films include those manufactured by Tredegar Industries Inc. of Terre Haute, IN and sold under the trade names X15306, X10962 and X10964. Other suitable backsheet materials may include breathable materials which permit vapors to escape from the diaper 20 while  
20 still preventing exudates from passing through the backsheet 26. Exemplary breathable materials may include materials such as woven webs, nonwoven webs, composite materials such as film-coated nonwoven webs, and microporous films such as manufactured by Mitsui Toatsu Co., of Japan under the designation ESPOIR NO and by EXXON Chemical Co., of Bay City, TX, under the designation EXXAIRE. Suitable  
25 breathable composite materials comprising polymer blends are available from Clopay Corporation, Cincinnati, OH under the name HYTREL blend P18-3097. Such breathable composite materials are described in greater detail in PCT Application No. WO 95/16746, published on June 22, 1995 in the name of E. I. DuPont and copending U.S. Patent Application Serial No. 08/744,487, filed on November 6, 1996 in the name of Curro.  
30 Other breathable backsheets including nonwoven webs and apertured formed films are

described in U.S. Pat. No. 5,571,096 issued to Dobrin et al. on November 5, 1996. Each of these references is hereby incorporated by reference herein.

The backsheet 26, or any portion thereof, may be elastically extensible in one or more directions. In one embodiment, the backsheet 26 may comprise a structural elastic-like film ("SELF") web. A structural elastic-like film web is an extensible material that exhibits an elastic-like behavior in the direction of elongation without the use of added elastic materials. The SELF web includes a strainable network having at least two contiguous, distinct, and dissimilar regions. Preferably, of the regions is configured so that it will exhibit resistive forces in response to an applied axial elongation in a direction parallel to the predetermined axis before a substantial portion of the other region develops significant resistive forces to the applied elongation. At least one of the regions has a surface-pathlength which is greater than that of the other region as measured substantially parallel to the predetermined axis while the material is in an untensioned condition. The region exhibiting the longer surface-pathlength includes one or more deformations which extend beyond the plane of the other region. The SELF web exhibits at least two significantly different stages of controlled resistive force to elongation along at least one predetermined axis when subjected to an applied elongation in a direction parallel to the predetermined axis. The SELF web exhibits first resistive forces to the applied elongation until the elongation of the web is sufficient to cause a substantial portion of the region having the longer surface-pathlength to enter the plane of applied elongation, whereupon the SELF web exhibits second resistive forces to further elongation. The total resistive forces to elongation are higher than the first resistive forces to elongation provided by the first region. SELF webs suitable for the present invention are more completely described in U.S. Patent No. 5,518,801 entitled Web Materials Exhibiting Elastic-Like Behavior, which issued to Chappell, et, al. on May 21, 1996, which is incorporated herein by reference. In alternate embodiments, the backsheet 26 may comprise elastomeric films, foams, strands, or combinations of these or other suitable materials with nonwovens or synthetic films.

The backsheet 26 may be joined to the topsheet 24, the absorbent core 28 or any other element of the diaper 20 by any attachment means known in the art. For example,



the attachment means may include a uniform continuous layer of adhesive, a patterned layer of adhesive, or an array of separate lines, spirals, or spots of adhesive. One preferred attachment means comprises an open pattern network of filaments of adhesive as disclosed in U.S. Patent 4,573,986 entitled "Disposable Waste-Containment Garment", which issued to Minetola et al. on March 4, 1986. Other suitable attachment means include several lines of adhesive filaments which are swirled into a spiral pattern, as is illustrated by the apparatus and methods shown in U.S. Patent 3,911,173 issued to Sprague, Jr. on October 7, 1975; U.S. Patent 4,785,996 issued to Ziecker, et al. on November 22, 1978; and U.S. Patent 4,842,666 issued to Werenicz on June 27, 1989. Each of these patents are incorporated herein by reference. Adhesives which have been found to be satisfactory are manufactured by H. B. Fuller Company of St. Paul, Minnesota and marketed as HL-1620 and HL-1358-XZP. Alternatively, the attachment means may comprise heat bonds, pressure bonds, ultrasonic bonds, dynamic mechanical bonds, or any other suitable attachment means or combinations of these attachment means as are known in the art.

The topsheet 24 is preferably positioned adjacent the body facing surface of the absorbent core 28 and may be partially or wholly joined thereto and/or to the backsheet 26 by any attachment means known in the art. Suitable attachment means are described above with respect to means for joining the backsheet 26 to other elements of the diaper 20. In one preferred embodiment of the present invention, the topsheet 24 and the backsheet 26 are joined directly to each other in some locations and are indirectly joined together in other locations by directly joining them to other elements of the diaper 20.

The topsheet may comprise one or more apertures 80 to ease penetration of exudates therethrough, such as urine and/or feces (solid, semi-solid, or liquid). The size of at least the primary aperture 80 is important in achieving the desired waste encapsulation performance. If the primary aperture 80 is too small, the waste may not pass through the aperture, either due to poor alignment of the waste source and the aperture location or due to fecal masses having a diameter greater than the aperture 80. If the aperture 80 is too large, the area of skin that may be contaminated by "rewet" from the article is increased. Typically, the aperture 80 should have an area of between about 10

cm<sup>2</sup> and about 50 cm<sup>2</sup>. The aperture 80 preferably has an area of between about 15 cm<sup>2</sup> and 35 cm<sup>2</sup>.

Further, the topsheet may be fully or partially elasticated or may be foreshortened so as to provide a void space between the topsheet 24 and the core 28. Exemplary  
5 structures including elasticized or foreshortened topsheets are described in more detail in U.S. Pat. No. 4,892,536 issued to DesMarais et al. on January 9, 1990 entitled "Absorbent Article Having Elastic Strands"; U.S. Pat. No. 4,990,147 issued to Freeland on February 5, 1991 entitled "Absorbent Article With Elastic Liner For Waste Material Isolation"; U.S. Pat. No. 5,037,416 issued to Allen et al. on August 6, 1991 entitled "Disposable  
10 Absorbent Article Having Elastically Extensible Topsheet"; and U.S. Pat. No. 5,269,775 issued to Freeland et al. on December 14, 1993 entitled "Trisection Topsheets For Disposable Absorbent Articles and Disposable Absorbent Articles Having Such Trisection Topsheets"; each of which are incorporated by reference herein.

The topsheet 24 is preferably compliant, soft feeling, and non-irritating to the  
15 wearer's skin. Further, at least a portion of the topsheet 24 is liquid pervious, permitting liquids to readily penetrate through its thickness. At least a portion of the topsheet 24 may be impermeable to liquids and solids or semi-solids or may be permeable to exudates only in a direction away from the wearer. Further, the topsheet 24 may include regions of differing permeability. For example, the topsheet 24 may be liquid permeable in the urine  
20 loading region of the diaper (generally front waist region and/or crotch region) and may be impermeable in the area surrounding the aperture 80. This provides good urine acquisition characteristics while preventing feces which pass through the aperture 80 from passing back towards the wearer's skin. The remainder of the topsheet may additionally comprise a multiplicity of secondary apertures as described in more detail in U.S. Patent  
25 No. 5,342,338 issued to Roe on August 30, 1994 entitled "Disposable Absorbent Article For Low-Viscosity Fecal Material". These secondary generally each have an area which is less than the area of the primary aperture but provide a means for low viscosity bodily wastes to penetrate the topsheet 24 if the wastes contact the topsheet 24 in a region other than that of the primary aperture 80.

A suitable topsheet 24 may be manufactured from a wide range of materials, such as porous foams; reticulated foams; apertured plastic films; or woven or nonwoven webs of natural fibers (e.g., wood or cotton fibers), synthetic fibers (e.g., polyester or polypropylene fibers), or a combination of natural and synthetic fibers. If the topsheet includes fibers, the fibers may be spunbond, carded, wet-laid, meltblown, hydroentangled, or otherwise processed as is known in the art. One suitable topsheet 24 comprising a web of staple length polypropylene fibers is manufactured by Veratec, Inc., a Division of International Paper Company, of Walpole, Massachusetts under the designation P-8.

Suitable formed film topsheets are described in U.S. Pat. No. 3,929,135, entitled "Absorptive Structures Having Tapered Capillaries", which issued to Thompson on December 30, 1975; U.S. Pat. No. 4,324,246 entitled "Disposable Absorbent Article Having A Stain Resistant Topsheet", which issued to Mullane, et al. on April 13, 1982; U.S. Patent 4,342,314 entitled "Resilient Plastic Web Exhibiting Fiber-Like Properties", which issued to Radel, et al. on August 3, 1982; U.S. Pat. No. 4,463,045 entitled "Macroscopically Expanded Three-Dimensional Plastic Web Exhibiting Non-Glossy Visible Surface and Cloth-Like Tactile Impression", which issued to Ahr, et al. on July 31, 1984; and U.S. Pat. No. 5,006,394 "Multilayer Polymeric Film" issued to Baird on April 9, 1991. Other suitable topsheets are made in accordance with U.S. Pat. Nos. 4,609,518 and 4,629,643 which issued to Curro et al. on September 2, 1986 and December 16, 1986, respectively, and both of which are incorporated herein by reference. Such formed films are available from The Procter & Gamble Company of Cincinnati, Ohio as "DRI-WEAVE" and from Tredegar Corporation of Terre Haute, Indiana as "CLIFF-T."

Preferably, the topsheet 24 is made of a hydrophobic material or is treated to be hydrophobic in order to isolate the wearer's skin from liquids contained in the absorbent core 28. If the topsheet 24 is made of a hydrophobic material, preferably at least the upper surface of the topsheet 24 is treated to be hydrophilic so that liquids will transfer through the topsheet more rapidly. This diminishes the likelihood that body exudates will flow off the topsheet 24 rather than being drawn through the topsheet 24 and being absorbed by the absorbent core 28. The topsheet 24 can be rendered hydrophilic by

treating it with a surfactant or by incorporating a surfactant into the topsheet. Suitable methods for treating the topsheet 24 with a surfactant include spraying the topsheet 24 material with the surfactant and immersing the material into the surfactant. A more detailed discussion of such a treatment and hydrophilicity is contained in U.S. Pat. No. 5 4,988,344 entitled "Absorbent Articles with Multiple Layer Absorbent Layers" issued to Reising, et al. on Jan. 29, 1991 and U.S. Pat. No. 4,988,345 entitled "Absorbent Articles with Rapid Acquiring Absorbent Cores" issued to Reising on Jan. 29, 1991. A more detailed discussion of some suitable methods for incorporating surfactant in the topsheet can be found in U.S. Statutory Invention Registration No. H1670, published on July 1, 10 1997 in the names of Aziz et al. Each of these references is hereby incorporated by reference herein. Alternatively, the topsheet 24 may include an apertured web or film which is hydrophobic. This may be accomplished eliminating the hydrophilizing treatment step from the production process and/or applying a hydrophobic treatment to the topsheet 24, such as a polytetrafluoroethylene compound like SCOTCHGUARD or a 15 hydrophobic lotion composition, as described below. In such embodiments, it is preferred that the apertures be large enough to allow the penetration of aqueous fluids like urine without significant resistance.

Any portion of the topsheet 24 may be coated with a lotion as is known in the art. Examples of suitable lotions include those described in U.S. Pat. Nos. 5,607,760 entitled 20 "Disposable Absorbent Article Having A Lotioned Topsheet Containing an Emollient and a Polyol Polyester Immobilizing Agent" which issued to Roe on March 4, 1997; U.S. Pat. No. 5,609,587 entitled "Diaper Having A Lotion Topsheet Comprising A Liquid Polyol Polyester Emollient And An Immobilizing Agent" which issued to Roe on March 11, 1997; U.S. Pat. No. 5,635,191 entitled "Diaper Having A Lotioned Topsheet Containing 25 A Polysiloxane Emollient" which issued to Roe et al. on June 3, 1997; and U.S. Pat. No. 5,643,588 entitled "Diaper Having A Lotioned Topsheet" which issued to Roe et al. on July 1, 1997. The lotion may function alone or in combination with another agent as the hydrophobizing treatment described above. The topsheet may also include or be treated with antibacterial agents, some examples of which are disclosed in PCT Publication No. 30 WO 95/24173 entitled "Absorbent Articles Containing Antibacterial Agents in the

Topsheet For Odor Control" which was published on September 14, 1995 in the name of Theresa Johnson. Further, the topsheet 24, the backsheet 26 or any portion of the topsheet or backsheet may be embossed and/or matte finished to provide a more cloth like appearance.

5       The absorbent core 28 may comprise any absorbent material which is generally compressible, conformable, non-irritating to the wearer's skin, and capable of absorbing and retaining liquids such as urine and other certain body exudates. The absorbent core 28 may be manufactured in a wide variety of sizes and shapes (e.g., rectangular, hourglass, "T"-shaped, asymmetric, etc.) and may comprise a wide variety of liquid-  
10       absorbent materials commonly used in disposable diapers and other absorbent articles such as comminuted wood pulp, which is generally referred to as airfelt. Examples of other suitable absorbent materials include creped cellulose wadding; meltblown polymers, including coform; chemically stiffened, modified or cross-linked cellulosic fibers; tissue, including tissue wraps and tissue laminates; absorbent foams; absorbent sponges;  
15       superabsorbent polymers; absorbent gelling materials; or any other known absorbent material or combinations of materials.

      The configuration and construction of the absorbent core 28 may also be varied (e.g., the absorbent core(s) or other absorbent structure(s) may have varying caliper zones, a hydrophilic gradient, a superabsorbent gradient, or lower average density and lower  
20       average basis weight acquisition zones; or may comprise one or more layers or structures). However, the total absorbent capacity of the absorbent core 28 should be compatible with the design loading and the intended use of the diaper 20.

      Exemplary absorbent structures for use as the absorbent core are described in U.S. Patent 4,610,678 entitled "High-Density Absorbent Structures" issued to Weisman et al.  
25       on September 9, 1986; U.S. Patent 4,673,402 entitled "Absorbent Articles With Dual-Layered Cores" issued to Weisman et al. on June 16, 1987; U.S. Patent 4,834,735, entitled "High Density Absorbent Members Having Lower Density and Lower Basis Weight Acquisition Zones", issued to Alemany et al. on May 30, 1989; U.S. Patent 4,888,231 entitled "Absorbent Core Having A Dusting Layer" issued to Angstadt on December 19,  
30       1989; U.S. Pat. No. 5,137,537 entitled "Absorbent Structure Containing Individualized,

Polycarboxylic Acid Crosslinked Wood Pulp Cellulose Fibers" which issued to Herron et al. on August 11, 1992; U.S. Patent 5,147,345 entitled "High Efficiency Absorbent Articles For Incontinence Management" issued to Young et al. on September 15, 1992; U.S. Pat. No. 5,342,338 entitled "Disposable Absorbent Article For Low-Viscosity Fecal  
5 Material" issued to Roe on August 30, 1994; U.S. Pat. No. 5,260,345 entitled "Absorbent Foam Materials For Aqueous Body Fluids and Absorbent Articles Containing Such Materials" issued to DesMarais et al. on November 9, 1993; U.S. Pat. No. 5,387,207 entitled "Thin-Until-Wet Absorbent Foam Materials For Aqueous Body Fluids And Process For Making Same" issued to Dyer et al. on February 7, 1995; and U.S. Pat. No.  
10 5,625,222 entitled "Absorbent Foam Materials For Aqueous Fluids Made From high Internal Phase Emulsions Having Very High Water-To-Oil Ratios" issued to DesMarais et al. on July 22, 1997. Each of these patents is incorporated herein by reference.

The diaper 20 may also include a sublayer disposed between the topsheet 24 and the backsheet 26. The sublayer may be any material or structure capable of accepting,  
15 storing or immobilizing bodily exudates. Thus, the sublayer may include a single material or a number of materials operatively associated with each other. Further, the sublayer may be integral with another element of the diaper 20 or may be one or more separate elements joined directly or indirectly with one or more elements of the diaper 20. Further, the sublayer may include a structure that is separate from the core 28 or may include or be  
20 part of at least a portion of the core 28.

Suitable materials for use as the sublayer may include large cell open foams, macro-porous compression resistant nonwoven highlofts, large size particulate forms of open and closed cell foams (macro and/or microporous), highloft nonwovens, polyolefin, polystyrene, polyurethane foams or particles, structures comprising a multiplicity of  
25 vertically oriented looped strands of fibers, absorbent core structures described above having punched holes or depressions, and the like. (As used herein, the term "microporous" refers to materials which are capable of transporting fluids by capillary action. The term "macroporous" refers to materials having pores too large to effect capillary transport of fluid, generally having pores greater than about 0.5 mm in diameter  
30 and more specifically, having pores greater than about 1.0 mm in diameter.) One

embodiment of a storage element includes a mechanical fastening loop landing element, having an uncompressed thickness of about 1.5 millimeters available as XPL-7124 from the 3M Corporation of Minneapolis, Minnesota. Another embodiment includes a 6 denier, crimped and resin-bonded nonwoven highloft having a basis weight of 110 grams per square meter and an uncompressed thickness of 7.9 millimeters which is available  
5 from the Glit Company of Wrens, Georgia. Other suitable absorbent and nonabsorbent storage elements are described in European Patent Application No. EP 0 847 738 A1 entitled "Disposable Absorbent Article Having Capacity to Store Low-Viscosity Fecal Material" published June 17, 1998 in the name of Roe, which is hereby incorporated by  
10 reference herein. Further, the sublayer, or any portion thereof, may include or be coated with a lotion or other known substances to add, enhance or change the performance or other characteristics of the element.

The diaper 20 may also comprise at least one elastic waist feature 34 that helps to provide improved fit and containment. The elastic waist feature 34 is generally intended  
15 to elastically expand and contract to dynamically fit the wearer's waist. The elastic waist feature 34 preferably extends at least longitudinally outwardly from at least one waist edge of the absorbent core 28 and generally forms at least a portion of the end edge 52 of the diaper 20. Disposable diapers are often constructed so as to have two elastic waist features, one positioned in the first waist region 36 and one positioned in the second waist  
20 region 38. Further, while the elastic waist feature 34 or any of its constituent elements may comprise one or more separate elements affixed to the diaper 20, the elastic waist feature 34 may be constructed as an extension of other elements of the diaper 20, such as the backsheet 26, the topsheet 24, or both the backsheet 26 and the topsheet 24.

The elastic waist feature 34 may be constructed in a number of different  
25 configurations including those described in U.S. Pat. No. 4,515,595 issued to Kievit et al. on May 7, 1985; U.S. Pat. No. 4,710,189 issued to Lash on December 1, 1987; U.S. Pat. No. 5,151,092 issued to Buell on September 9, 1992; and U.S. Pat. No. 5,221,274 issued to Buell on June 22, 1993. Other suitable waist configurations may include waistcap features such as those described in U.S. Pat. No. 5,026,364 issued to Robertson on June

25, 1991 and U.S. Pat. No. 4,816,025 issued to Foreman on March 28, 1989. All of the above mentioned references are incorporated herein by reference.

The diaper 20 may also include a fastening system 40. The fastening system 40 preferably maintains the first waist region 36 and the second waist region 38 in an overlapping configuration so as to provide lateral tensions about the circumference of the  
5 diaper 20 to hold the diaper 20 on the wearer. The fastening system 40 preferably comprises tape tabs and/or hook and loop fastening components, although any other known fastening means are generally acceptable. Some exemplary fastening systems are disclosed in U.S. Patent 3,848,594 entitled "Tape Fastening System for Disposable  
10 Diaper" issued to Buell on November 19, 1974; U.S. Patent B1 4,662,875 entitled "Absorbent Article" issued to Hirotsu et al. on May 5, 1987; U.S. Patent 4,846,815 entitled "Disposable Diaper Having An Improved Fastening Device" issued to Scripps on July 11, 1989; U.S. Patent 4,894,060 entitled "Disposable Diaper With Improved Hook Fastener Portion" issued to Nestegard on January 16, 1990; U.S. Patent 4,946,527 entitled  
15 "Pressure-Sensitive Adhesive Fastener And Method of Making Same" issued to Battrell on August 7, 1990; and the herein before referenced U.S. Pat. No. 5,151,092 issued to Buell on September 9, 1992; and U.S. Pat. No. 5,221,274 issued to Buell on June 22, 1993. The fastening system may also provide a means for holding the article in a disposal configuration as disclosed in U.S. Pat. No. 4,963,140 issued to Robertson et al. on  
20 October 16, 1990. Each of these patents is incorporated herein by reference. In alternative embodiments, opposing sides of the garment may be seamed or welded to form a pant. This allows the article to be used as a pull-on type diaper, such as a training pant.

The diaper 20 may also comprise side panels 30. The side panels 30 may be elastic or extensible to provide a more comfortable and contouring fit by initially  
25 conformably fitting the diaper 20 to the wearer and sustaining this fit throughout the time of wear well past when the diaper 20 has been loaded with exudates since the elasticized side panels 30 allow the sides of the diaper 20 to expand and contract. The side panels 30 may also provide more effective application of the diaper 20 because even if the diaperer pulls one elasticized side panel 30 farther than the other during application, the diaper 20  
30 will "self-adjust" during wear.



While the diaper 20 of the present invention preferably has the side panels 30 disposed in the second waist region 38, the diaper 20 may be provided with side panels 30 disposed in the first waist region 36 or in both the first waist region 36 and the second waist region 38. The side panels 30 may be constructed in any suitable configurations.

5 Examples of diapers with elasticized side panels are disclosed in U.S. Patent 4,857,067, entitled "Disposable Diaper Having Shirred Ears" issued to Wood, et al. on August 15, 1989; U.S. Patent 4,381,781 issued to Sciaraffa, et al. on May 3, 1983; U.S. Patent 4,938,753 issued to Van Gompel, et al. on July 3, 1990; the herein before referenced U.S. Pat. No. 5,151,092 issued to Buell on September 9, 1992; and U.S. Pat. No. 5, 221,274

10 issued to Buell on June 22, 1993; U.S. Patent No. 5,669,897 issued to LaVon, et al. on September 23, 1997 entitled "Absorbent Articles Providing Sustained Dynamic Fit"; U.S. Patent Application Serial No. 08/155,048 entitled "Absorbent Article With Multi-Directional Extensible Side Panels" filed November 19, 1993 in the names of Robles, et al.; each of which is incorporated herein by reference.

15 The diaper 20 preferably further includes leg cuffs 32 which provide improved containment of liquids and other body exudates. Leg cuffs may also be referred to as leg bands, side flaps, barrier cuffs, or elastic cuffs. U.S. Patent 3,860,003 describes a disposable diaper which provides a contractible leg opening having a side flap and one or more elastic members to provide an elasticized leg cuff (a gasketing cuff). U.S. Patent

20 Nos. 4,808,178 and 4,909,803 issued to Aziz et al. on February 28, 1989 and March 20, 1990, respectively, describe disposable diapers having "stand-up" elasticized flaps (barrier cuffs) which improve the containment of the leg regions. U.S. Pat. Nos. 4,695,278 and 4,795,454 issued to Lawson on September 22, 1987 and to Dragoo on January 3, 1989, respectively, describe disposable diapers having dual cuffs, including gasketing cuffs and

25 barrier cuffs. In some embodiments, it may be desirable to treat all or a portion of the leg cuffs with a lotion, as described above.

Embodiments of the present invention may also include pockets for receiving and containing waste, spacers which provide voids for waste, barriers for limiting the movement of waste in the article, compartments or voids which accept and contain waste

30 materials deposited in the diaper, and the like, or any combinations thereof. Examples of

pockets and spacers for use in absorbent products are described in U.S. Patent 5,514,121 issued to Roe et al. on May 7, 1996, entitled "Diaper Having Expulsive Spacer"; U.S. Patent 5,171,236 issued to Dreier et al on December 15, 1992, entitled "Disposable Absorbent Article Having Core Spacers"; U.S. Patent 5,397,318 issued to Dreier on 5 March 14, 1995, entitled "Absorbent Article Having A Pocket Cuff"; U.S. Patent 5,540,671 issued to Dreier on July 30, 1996, entitled "Absorbent Article Having A Pocket Cuff With An Apex"; and PCT Application WO 93/25172 published December 3, 1993, entitled "Spacers For Use In Hygienic Absorbent Articles And Disposable Absorbent Articles Having Such Spacer"; and U.S. Patent 5,306,266, entitled "Flexible Spacers For 10 Use In Disposable Absorbent Articles", issued to Freeland on April 26, 1994. Examples of compartments or voids are disclosed in U.S. Patent 4,968,312, entitled "Disposable Fecal Compartmenting Diaper", issued to Khan on November 6, 1990; U.S. Patent 4,990,147, entitled "Absorbent Article With Elastic Liner For Waste Material Isolation", issued to Freeland on February 5, 1991; U.S. Patent 5,62,840, entitled "Disposable 15 Diapers", issued to Holt et al on November 5, 1991; and U.S. Patent 5,269,755 entitled "Trisection Topsheets For Disposable Absorbent Articles And Disposable Absorbent Articles Having Such Trisection Topsheets", issued to Freeland et al on December 14, 1993. Examples of suitable transverse barriers are described in U.S. Pat. No. 5,554,142 entitled "Absorbent Article Having Multiple Effective Height Transverse Partition" issued 20 September 10, 1996 in the name of Dreier et al.; PCT Patent WO 94/14395 entitled "Absorbent Article Having An Upstanding Transverse Partition" published July 7, 1994 in the name of Freeland, et al.; and U.S. 5,653,703 Absorbent Article Having Angular Upstanding Transverse Partition, issued Aug. 5, 1997 to Roe, et al. All of the above-cited references are hereby incorporated by reference herein.

25 Preferred embodiments of the present invention are particularly suited to the entrapment or encapsulation of bodily waste and thus reduce the amount and area of contamination of the wearer's skin by the waste. In order to achieve the desired level of performance, especially for viscous bodily waste such as feces, at least two functions should be performed. First, the diaper should have means of maintaining proximity of the 30 accepting element of the diaper (e.g., an aperture in the topsheet) to the wearer's waste

exit point (e.g., anus) of the wearer. Second, the diaper should provide a void space 70 for the waste even under applied pressures which are typical of those generated by a wearer on the crotch and buttocks regions of the article while the wearer is in a seated position.

5        In order to provide a void space 70 which can be maintained under pressure, preferred embodiments of the present invention include one or more spacers or spacing members 60. The spacing member(s) 60 are intended to space the topsheet 24 or other covering layer away from the absorbent core 28 and/or other underlying layers such as sublayers, acquisition layers and the like. However, it is also contemplated that the  
10        spacing member 60 may space apart any other two elements of the diaper 20, including but not limited to the topsheet 24 and the backsheet 26, the acquisition layer and the core 28, the core 28 and the backsheet 26, etc. Nonlimiting, exemplary spacers 60 are disclosed in the patents incorporated by reference above.

      The spacing member 60 may be of any suitable size and/ or shape. In preferred  
15        embodiments, the spacing member 60 has a body facing side 62, a backsheet facing side 64 and a thickness T of between about 0.5 cm and about 3.0 cm in use. (As used herein, the thickness T of the spacer 60 is the distance between the body facing side 63 and the garment facing side 65 of the spacer 60.) Further, it is preferred that the spacer 60 create and maintain during use a void space 70 of between at least about 10 cubic cm and about  
20        150 cubic cm, and preferably between about 25 cubic cm and about 75 cubic cm. It is also important that the lateral dimension X of the void space 70 be large enough to accommodate the feces, but narrow enough such that the spacing member 60 can support the ischia of the wearer. Preferably, the lateral dimension X of the void space 70, defined by the spacer 60 in the area corresponding to the anus of the wearer, is between about 1  
25        cm and about 5 cm, and more preferably between about 1.5 cm and about 3.5 cm.

      Although the shape of the spacer 60 is not critical, it has been found that elliptical and "keyhole" shaped spacers (e.g. the spacer shown in Fig. 4) perform particularly well. If such a spacer 60 is implemented, it is preferred that the spacer 60 be disposed generally in the crotch region 37 of the diaper 20 and oriented such that the first region 120 of the  
30        spacer 60 is located toward the front waist of the diaper 20 when worn and the second

region 125 of the spacer 60 is located toward the rear waist of the diaper 20 when worn. Alternatively, U-shaped spacers may be suitable for use in certain embodiments (preferably with the open end of the U-shape oriented toward the rear waist region of the diaper 20 when worn). In any case, the spacer 60 may be unitary or may comprise a  
5 multiplicity of separate or operatively associated parts. Further, the spacer 60 may have a closed perimeter 65 or may comprise openings, holes, or channels extending from the fecal void space 70 through the spacer wall 62 to the perimeter 65 of the spacer 60. Such embodiments may be useful to allow distribution of feces from the void space 70 to other parts of the diaper 20.

10 The spacing member 60 may comprise any material or combination of materials which are suitable for use in an absorbent article to be worn by a human wearer. For example, the spacing member 60 may include foams, woven or nonwoven webs, thermoplastic materials, organic materials, fibers, gels, rubber or synthetic rubber, etc. In one preferred embodiment, the spacing member 60 comprises an absorbent foam made  
15 from a 16:1 water/oil emulsion, having a glass transition temperature of about 10°C, and having a compression of about 40% in a dry state and about 30% in a wet state (i.e., when saturated with water) under about 1.0 psi applied pressure. Thus, in certain embodiments, the compression under about 1.0 psi in the wet state may be less than the compression under about 1 psi in the dry state.

20 In a preferred embodiment, the spacing member 60 is relatively soft, but resilient and capable of withstanding the forces typical of a baby's movements and/or the weight of a baby sitting or lying on the spacing member 60. Thus, the spacing member 60 should be capable of withstanding at least 0.5 psi and preferably at least about 1.0 psi while compressing no more than about 60%, and preferably no more than about 30% in both  
25 wet and dry conditions.

In yet another embodiment, the spacing member 60 may be activatable during use. That is, the spacing member 60 may be stored in the diaper 20 in one configuration and may be activated by some event or material which changes the configuration of the spacing member 60 or the surrounding structure so as to provide the diaper 20 with a  
30 desired configuration for receiving and/or storing bodily exudates. For example, the

spacing member 60 may include a material which expands when contracted by water, urine, feces, enzymes or other means associated with the wearer's body or bodily exudates. Changes in temperature, pH and saline concentration are also "triggers" which can activate the spacing member 60. Thus, when the wearer urinates, the spacing member  
5 60 may increase in thickness, change shape or otherwise orient itself in the diaper 20 to provide a void space 70 into which urine and/or feces can flow.

In preferred embodiments, at least a portion of the spacing member 60 is joined to the topsheet 24. This helps keep the primary aperture 80 aligned with the void space 70 of the spacer 60 during use. It is also preferred that at least a portion of the spacer 60 be  
10 joined with at least a portion of the structure which underlies the spacer 60, such as the core 28, a sublayer or the backsheet 28. In any case, the spacer 60 may be joined directly or indirectly by any means known in the art. Typical joining means include adhesives, heat, pressure, static, magnetism, snaps, hook and loop fasteners and the like.

The advantages of a diaper including an apertured topsheet and a spacing member  
15 60 are significantly reduced if the aperture 80 does not stay aligned with the wearer's anus and the void space 70 provided by the spacer 60 throughout the time of use (or at least until the wearer has a bowel movement). Accordingly, the diaper 20 of the present invention is preferably provided with a means for maintaining the aperture 80 in alignment with the wearer's anus. Preferably, the diaper 20 includes a topical adhesive or  
20 body adhering composition which acts to hold the aperture 80 in place during use. As shown in Figure 2, the topical adhesive 90 may be located on the topsheet 24. However, the body adhering composition 90 may also be integral with the material making up the topsheet 24 or other element of the absorbent article or may be a separate material disposed directly or indirectly on all or any portion of the absorbent article. Further, the  
25 body adhering composition 90 may be disposed on any portion of the absorbent article in any pattern or configuration including, but not limited to lines, stripes, dots, and the like.

In one preferred embodiment, the topical adhesive 90 is disposed on the topsheet 24 in a continuous ring about the aperture 80. However, embodiments are contemplated wherein the topical adhesive 90 surrounds only a portion of the aperture 80 and/or is  
30 disposed in locations not directly adjacent the aperture 80, such as around the edge of the

topsheet 24, on the leg cuffs 32 or in one or both of the waist regions. Alternatively, topical adhesive 90 may be disposed on the spacer 60 itself. If this is done, the topical adhesive 90 may be on an exposed surface of the spacer 60 or may be located beneath an apertured, slit or otherwise reticulated layer such that the topical adhesive 90 can contact the wearer in use.

The body adhering composition 90 may include any one or more substances capable of releasably adhering to the skin of the wearer. Further, the body adhering composition 90 may be in the form of a gel, lotion, film, web or the like. Examples of suitable body adhering compositions include adhesives, gelatin, petrolatum, waxes such as silicone or petroleum waxes, oils such as silicone or petroleum based oils, skin care compositions or ingredients thereof, as described below, and the like. Suitable topical adhesives include, but are not limited to, hydrogel or hydrocolloid adhesives such as acrylic based polymeric adhesives, and the like. (Some exemplary hydrogel and/or hydrocolloid adhesives are disclosed in U.S. Patents 4,231,369; 4,593,053; 4,699,146; 4,738,257; and 5,726,250; each of which is incorporated by reference herein.) The topical adhesives may also include any "medical adhesive" which is compatible for use with biological tissue, such as skin. Acrylic medical adhesives suitable for use as body adhering compositions 80, include adhesives available from Adhesive Research, Inc., of Glen Rock, PA, under the designations MA-46, MA-312, "MTTM" High MVTR adhesive, and AS-17. Rubber-based medical adhesives, such as SB-2 from Adhesive Research Inc. may also be suitable. Other exemplary adhesives include Dow Corning Medical Adhesive (Type B) available from Dow Corning, Midland, MI; "MEDICAL ADHESIVE" from Hollister Inc., of Libertyville, IL; 3M Spray Adhesives #79, 76, 77 and 90 available from the 3M Corp. of St. Paul, MN; and "MATISOL" liquid adhesive available from Ferndale Laboratories of Ferndale, MI. Other medical adhesives are described in U.S. Patent Nos. 4,078,568; 4,140,115; 4,192,785; 4,393,080; 4,505,976; 4,551,490; 4,768,503 and polyacrylate and polymethacrylate hydrogel adhesives are disclosed in U.S. Patents 5,614,586 and 5,674,275; the disclosure of each of which is incorporated by reference herein. Yet another exemplary adhesive comprising polyvinyl pyrrolidone and a multi-functional amine-containing polymer is disclosed in WO

94/13235A1. (The disclosure of each of these references is incorporated herein by reference.) Alternative body adhering means which may be used in place of or in addition to those described above include static electricity, suction and the like. In any case, it is preferred that the body adhering composition 90 permit vapors to pass (i.e., breathable),  
5 be compatible with the skin and otherwise skin friendly. Further, it is preferred that the body adhesive 90 be at least partially hydrophobic, preferably 60%, more preferably 80%, by weight of the adhesive consist of hydrophobic components. However, hydrophilic adhesives are contemplated in certain embodiments of the present invention.

In preferred embodiments as described in co-pending EPO Application nos.  
10 96120738.8, 97110730.5 and 97120336.9 (each of which are incorporated by reference herein), removal of the body adhering composition from the skin is relatively painless. In these embodiments, the body adhesive or body adhering composition has an elastic modulus at a temperature of 37°C (100° Fahrenheit) abbreviated  $C'_{37}$  and a viscous modulus at a temperature of 37°C (100° Fahrenheit) of  $G''_{37}$ . The adhesive further has a  
15 dynamic elastic behavior defined as  $\Delta G'_{37}$  which is the difference of  $G'_{37}$  at a frequency of 100 rad/sec and  $G'_{37}$  at a frequency of 1 rad/sec and a dynamic viscous behavior  $\Delta G''_{37}$  which is the difference of  $G''_{37}$  at a frequency of 100 rad/sec and  $G''_{37}$  at a frequency of 1 rad/sec. Further, the body adhesive preferably satisfies the following conditions.

$G'_{37}$ (1 rad/sec)	is in the range of about 1500 Pa to about 20000 Pa, preferably of about 1500 Pa to about 15000 Pa, most preferably of about 3000 Pa to of about 10000 Pa.
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$G''_{37}$ (1 rad/sec)	is in the range of about 100 Pa to about 15000 Pa, preferably of about 100 Pa to of about 10000 Pa, most preferably 300 Pa to of about 5000 Pa.
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The ratio of $G'_{37}$	(1 rad/sec) / $G''_{37}$ (1 rad/sec) is in the range
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of about 3 to about 30.

The ratio

$$\frac{G'_{37} (100 \text{ rad/sec}) - G''_{37} (100 \text{ rad/sec})}{G'_{37} (1 \text{ rad/sec}) - G''_{37} (1 \text{ rad/sec})}$$

$$G'_{37} (1 \text{ rad/sec}) - G''_{37} (1 \text{ rad/sec})$$

is not less than about 0.5, preferably in the range of about 0.7 to 3, most preferably in the range of about 1 to about 1.8.

Either the ratio of

$\Delta G'_{37}/G'_{37}$  (1 rad/sec) is not greater than about 1.5, preferably not greater than about 0.8, or  $\Delta G'_{37}$  is not greater than about 10000 Pa, preferably less than 5000 Pa, most preferably less than about 2000 Pa, or both.

The value of the ratio  $G'_{37}/G''_{37}$  at least for the frequency range from about 1 rad/s up to 100 rad/s should preferably about 3.3 or above, more preferably about 5 or above, most preferably about 10 or above while not exceeding about 50, preferably about 30, anywhere in the frequency interval.

To obtain the desired characteristics, the body adhering composition 90 may comprise: from 0.5 to 20%, preferably 5% to 15%, by weight of a macromolecular polymeric substance or a mixture of such substances soluble or swellable in the below mentioned plasticizer(s). As not limiting examples such macromolecular or polymeric substances can be natural and/or synthetic such as natural gums or derivatives such as natural gums and gelatins, their derivatives and alginates; polyacrylics; polyvinyl alcohol; polyethylene oxide; polyvinylpyrrolidone (PVP) or polyvinylethers, their copolymers and derivatives; cellulose derivatives; Block Copolymer Thermoplastic Elastomers and



preferably Styrenic block Copolymers and more preferably the hydrogenated grades Styrol/Ethylene-Butylene/Styrol (SEBS), Styrene/Isoprene/Styrene (SIS), and Styrol/Ethylene-Propylene/Styrol (SEPS). Further, preferred body adhesive compositions may comprise from 45 to 99.5% by weight, preferably from 51 to 99.5% by weight, of a plasticizing substance or a mixture of plasticizing substances, which are liquid at room temperature. As non-limiting examples the plasticizer can be water, various alcohols (like in particular glycerol), glycols and their ethers, polyglycols, liquid polybutenes, esters such as phthalates, adipates, stearates, palmitates, sebacates, or myristates, natural or synthetic oils such as vegetable oils, mineral oils, or combinations thereof. Further, the body adhesive may include from 0% to 50% by weight of the composition, preferably 0% to 600% by weight of the macromolecular polymeric substance, of a tackifying resin whose main scope is to tailor the T<sub>g</sub> especially in systems based on synthetic polymers. Also, preferred body adhesives may include from 0 to 10% and more preferably from 0 to 5% by weight of substances for facilitating and stabilizing the gel and the gel forming process both of hydrophilic or hydrophobic liquid plasticizers. These may be for oily systems, e.g., the fatty acids of C<sub>8</sub> to C<sub>22</sub>, their metallic salts and their polyoxo-derivatives; lanolin derivatives; silica; bentonite, montmorillonite and their derivatives; polyamides, waxes or mixtures thereof.

Common additives known in the art as preservative, antioxidants, anti UV, pigments, mineral fillers, rheology modifiers and the like can also be comprised in quantities up to 10% each. Also, when chemical crosslinks are formed in the system, a cross-linking agent can be present preferably in quantities up to 5% by weight. Chemical crosslinking can be formed also by mutual neutralization of polymers having different functionalities as in the reaction between acid polyacrylics and polysaccharides.

Suitable skin care compositions which may be used as, with, or in place of the body adhering compositions include Category I actives as defined by the U.S. Federal Food and Drug Administration's (FDA) Tentative Final Monograph on Skin Protectant Drug Products for Over-the-Counter Human Use, which presently include: allantoin, aluminum hydroxide gel, calamine, cocoa butter, dimethicone, cod liver oil (in combination), glycerine, kaolin, petrolatum, lanolin, mineral oil, shark liver oil, white

petrolatum, talc, topical starch, zinc acetate, zinc carbonate, zinc oxide, and the like. Other potentially useful materials are Category III actives as defined by the U.S. Federal Food and Drug Administration's Tentative Final Monograph on Skin Protectant Drug Products for Over-the-Counter Human Use tentative final monograph on skin protectant  
5 drug products for over-the-counter human use, which presently include: live yeast cell derivatives, aldioxa, aluminum acetate, microporous cellulose, cholecalciferol, colloidal oatmeal, cysteine hydrochloride, dexpanthanol, Peruvian balsam oil, protein hydrolysates, racemethionine, sodium bicarbonate, Vitamin A, and the like. Many of the FDA monographed skin care ingredients are currently utilized in commercially available skin  
10 care products, such as "A AND D" Ointment, "VASELINE" Petroleum Jelly, "DESITIN" Diaper Rash Ointment and Daily Care Ointment, "GOLD BOND" Medicated Baby Powder, "AQUAPHOR" Healing Ointment, "BABY MAGIC" Baby Lotion, "JOHNSON'S ULTRA SENSITIVE" Baby Cream, Johnson's baby lotion, lip balms, etc. Other suitable skin care compositions (e.g., lotions) are described in detail in U.S. Patent  
15 No. 5,643,588; U.S. Patent No. 5,607,760; U.S. Patent No. 5,609,587; and U.S. Patent No. 5,635,191; each of these references being incorporated herein by reference.

The skin care compositions may also include (feces chemical modification agents), pH control agents, enzyme inhibitors, antimicrobials, odor absorbing agents (such as cyclodextrins or activated charcoal), or antimicrobials. Examples of enzyme inhibitors  
20 include protease inhibitors (e.g., hexamidine derivatives), lipase inhibitors (e.g., triacetin), urease inhibitors, and the like. Citric acid is an example of a suitable proton-donating pH control agent. In one preferred embodiment, a skin care composition comprising about 57% by wt. petrolatum, about 42% by wt. stearyl alcohol, and about 1% aloe extract is applied to about the topsheet 24 about the aperture 80 at add-on level of at least about  
25 5 mg/cm<sup>2</sup>.

#### Example:

One preferred embodiment of the present invention is an absorbent article as is generally shown in Figure 2. The absorbent article is provided with a nonwoven topsheet  
30 24 (e.g., P-8 available from Veratec, Inc.) including an elliptical aperture 80 having an

open area of about  $17 \text{ cm}^2$ . (As used herein the term "open area" refers to the plan view area of the aperture.) In a preferred embodiment, the aperture 80 has a longitudinal dimension A of about 6 cm and a lateral dimension B of about 3.5 cm. The aperture 80 is preferably located in approximately the area of the diaper 20 associated with the wearer's anus. A layer of PG-70 adhesive 90 (available on a one mm thick open cell foam substrate from First Water Co., of Coventry, England) is applied to the topsheet 24 in the area immediately surrounding the aperture 80 in about a 1 mm thick and about 1.5 cm wide band.

An absorbent foam spacer 60 is disposed between the topsheet 24 and the backsheet 26 and is affixed to the underlying structure (e.g. core 28) of the diaper 20 such that the void space 70 created by the spacer 60 is aligned with the aperture 80 in the topsheet 24. The spacer 60 has a "keyhole" geometry, as shown in Figure 4. Further, the spacer 60 has a thickness T of about 1.25 cm, a void space area of about  $24 \text{ cm}^2$ , a width W of about 3.5 cm in the region corresponding approximately to the anus, and a void space volume of about  $33 \text{ cm}^3$ . (As used herein the term "void space area" means the plan view area of the void space 70. Void space volume as used herein is the volume of the void space created by the spacer 60.) The void space 70 preferably has a length Y of about 8.4 cm and a width X of about 3.9 cm. The spacer 60 preferably compresses no more than about 60%, more preferably 30% under a 1.0 psi load when the spacer 60 is in a dry state, and no more than about 60%, more preferably 30% under a 1.0 psi load when wet or saturated (e.g., with water).

The spacer 60 preferably includes an absorbent foam made from a 16:1 water/oil emulsion, having a glass transition temperature of about  $10^\circ\text{C}$ , and having a compression of about 43% dry and about 32% wet under about 1.0 psi applied pressure. The absorbent foam is die cut into two 0.625 cm thick layers having the "keyhole" shape shown in Figure 4. The two layers are then stacked on top of each other such that the void space 70 of each layer is aligned. The walls 62 of the dual layer foam spacer 60 are preferably wrapped in strips of a nonwoven (e.g. P-8). At least a portion of the spacer 60 is attached to the absorbent core 28. (The spacer 60 may be also or alternatively joined with another underlying element such as a sublayer, a secondary topsheet or the backsheet). It is also

preferred that the spacer 60 be joined to the topsheet 24 along some or all of the spacer's perimeter 65. This helps keep the aperture 80 in the topsheet 24 aligned with the void space 70 of the spacer 60 during use.

In an alternate embodiment, as shown in Figure 6, the topsheet 24 may be configured so as to provide a cone 130 structure when worn. As shown in Fig. 6, the cone structure is formed when the topsheet is pulled away from the core until it is restrained by an attachment to an underlying layer, such as a secondary topsheet, spacer, core, or backsheet. The cone structure 130 preferably has a height H (the height is defined as the distance above the backsheet facing side of the spacer to which the aperture 80 of the topsheet 24 may be raised under a force of less than 100 grams when the diaper 20 is in a flat configuration). The height H should not be too great or application may become difficult (i.e., the caretaker may have to take extra care or time to align the top of the cone 130 to the wearer's waste source region) or so that the cone 130 can fold over on itself during wearing and block the aperture 80. Conversely, the height H should not be too small or there may not be enough volume in the cone 130 to handle any overflow from the spacer's void space 70. A height H of between about 1.0 cm and about 10 cm is generally suitable. Preferably the height H is between about 2 cm and about 7 cm.

While particular embodiments of the present invention have been illustrated and described, it would be obvious to those skilled in the art that various other changes and modifications can be made without departing from the spirit and scope of the invention. It is therefore intended to cover in the appended claims all such changes and modifications that are within the scope of this invention.

## WHAT IS CLAIMED IS:

1. An absorbent article having a first waist region, a second waist region and a crotch region located between the first waist region and the second waist region, the absorbent article comprising:  
a topsheet including a primary aperture for receiving fecal waste,  
a backsheet joined with at least a portion of the topsheet,  
an absorbent core disposed between at least a portion of the topsheet and the backsheet,  
the absorbent article characterized by: a spacing member disposed between the topsheet and the backsheet, the spacing member providing a void space into which feces can be directed; and  
a body adhering composition disposed about at least a portion of the primary aperture for adhering the topsheet of the absorbent article to the wearer during use.
2. The absorbent article of Claim 1 wherein the primary aperture has an area between about 10 cm<sup>2</sup> and about 50 cm<sup>2</sup>, preferably between about 15 cm<sup>2</sup> and about 35 cm<sup>2</sup>.
3. The absorbent article of any of the preceding claims wherein the body adhering composition includes a material selected from the following group: medical adhesives, hydrogel adhesives, gelatin, petrolatum, waxes, oils, skin care compositions.
4. The absorbent article of any of the preceding claims wherein the spacing member has a void space volume of between about 10 and about 150 cm<sup>3</sup>, preferably between about 25 and about 75 cm<sup>3</sup>.
5. The absorbent article of any of the preceding claims wherein the spacing member has thickness of between about 0.5 cm and about 3 cm in use.

6. The absorbent article of any of the preceding claims wherein the spacer is activated by one or more of the following: water, urine, feces, enzymes, a change in pH, a change in saline concentration or a change in temperature.
7. The absorbent article of any of the preceding claims wherein the spacing member is joined with one or more of the following: the topsheet, the backsheet, the core or a sublayer.
8. The absorbent article of Claim 1 wherein the spacing member has a compression under about 1psi of less than about 60 percent, preferably less than about 30 percent when measured in a dry state or wherein the spacing member has a compression under about 1psi of less than about 60 percent, preferably less than about 30 percent when measured in a wet state.
9. The absorbent article of any of the preceding claims wherein the spacing member compresses less under a pressure of about 1psi when in a wet state than the spacing member compresses under a pressure of about 1psi in a dry state.
10. The absorbent article of any of the preceding claims wherein the topsheet is impermeable adjacent the aperture in the topsheet.
11. The absorbent article of any of the preceding claims wherein the topsheet includes a multiplicity of secondary apertures each having an area less than the area of the primary aperture.
12. The absorbent article of any of the preceding claims further including a sublayer disposed between the topsheet and the backsheet the sublayer preferably including a material selected from the following group: open cell foams, closed cell foams, nonwoven webs, particles, looped strands of fibers, and cellulose.

13. The absorbent article of any of the preceding claims wherein the topsheet provides a cone structure when a lifting force is applied adjacent the primary aperture, the cone structure extending from the primary aperture to a location where the topsheet is joined to an underlying layer, the cone structure providing space between the topsheet and the core for accepting and storing fecal material which passes through the primary aperture.

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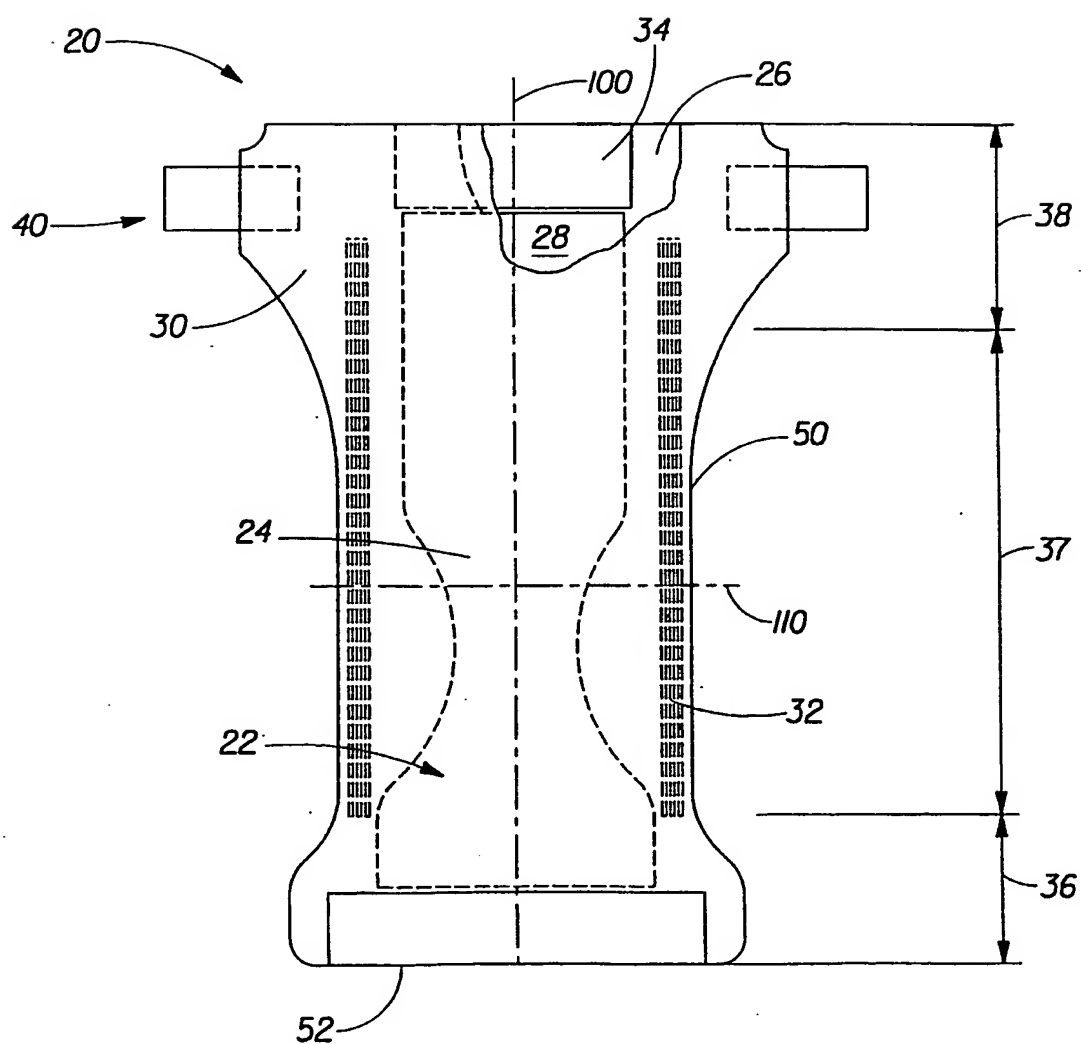


Fig. 1





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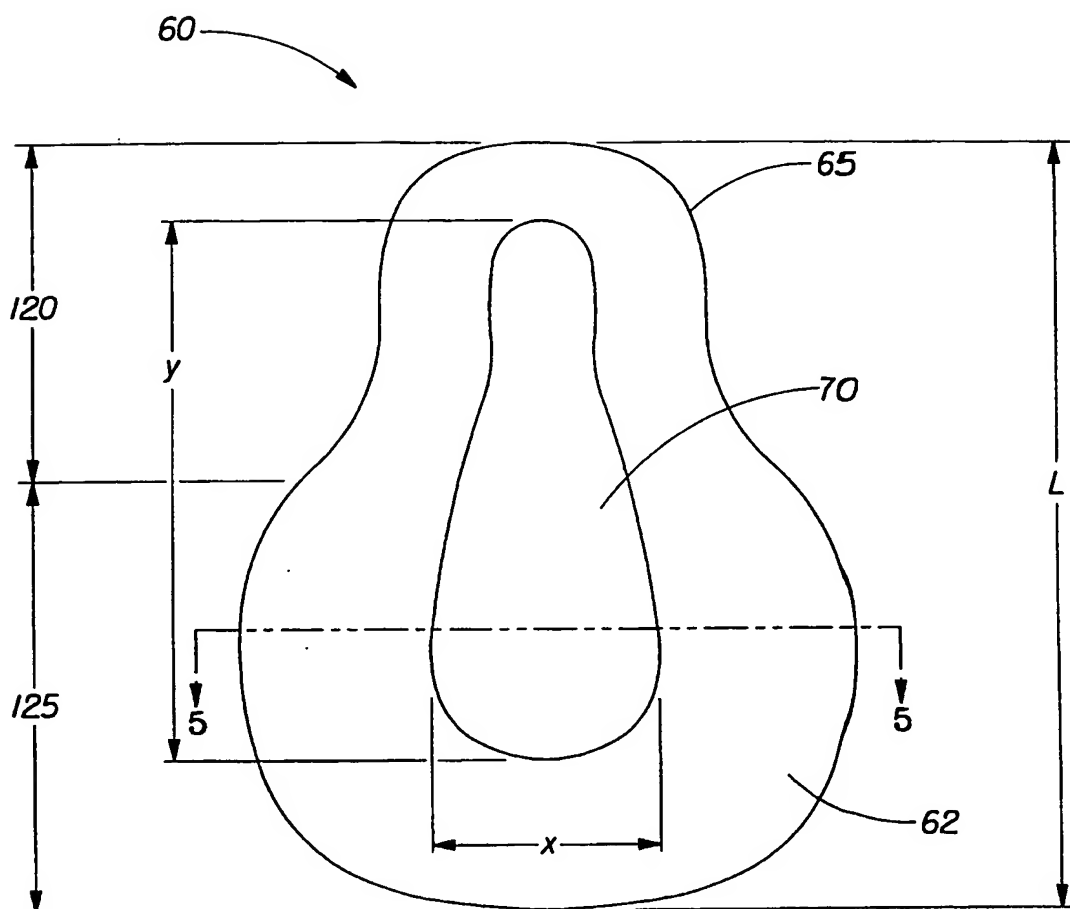


Fig. 4

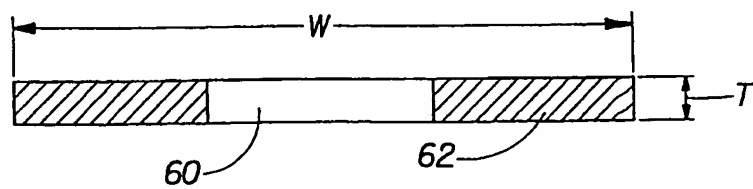


Fig. 5

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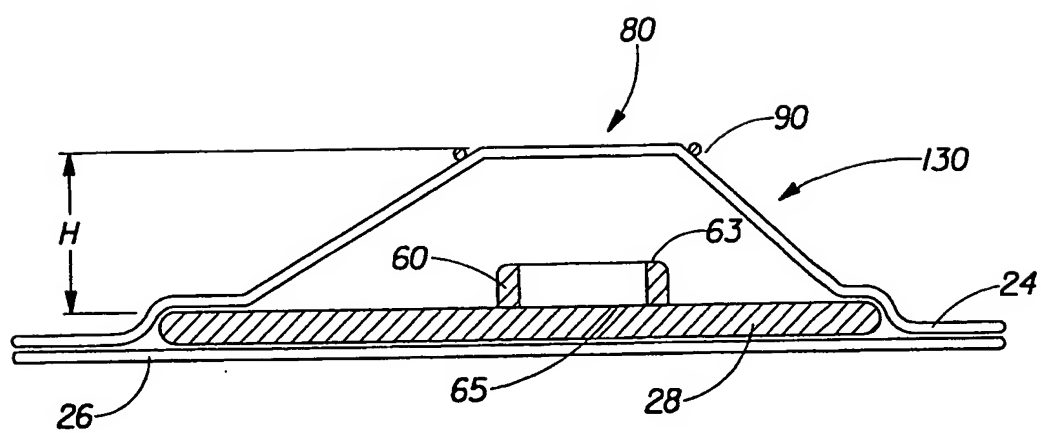


Fig. 6

# INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US 99/24291

**A. CLASSIFICATION OF SUBJECT MATTER**  
IPC 7 A61F13/15 A61F13/82

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 1996, no. 09, 30 September 1996 (1996-09-30) & JP 08 117261 A (BEPPU YOSHIO), 14 May 1996 (1996-05-14) abstract	1-4
P,A	EP 0 887 063 A (PROCTER & GAMBLE) 30 December 1998 (1998-12-30) claims; figures	1-4
A	WO 98 17219 A (KIMBERLY CLARK CO) 30 April 1998 (1998-04-30) claims; figures	1,5,7,10
A	US 5 330 459 A (BECK THEODORA ET AL) 19 July 1994 (1994-07-19) claims; figures	1,5,6

☐ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

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Date of the actual completion of the international search

16 February 2000

Date of mailing of the international search report

02/03/2000

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# INTERNATIONAL SEARCH REPORT

information on patent family members

International Application No

PCT/US 99/24291

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 08117261 A	14-05-1996	NONE	
EP 0887063 A	30-12-1998	AU 8172198 A	19-01-1999
		AU 8172298 A	19-01-1999
		AU 8172398 A	19-01-1999
		AU 8172498 A	19-01-1999
		AU 8172698 A	19-01-1999
		AU 8268798 A	19-01-1999
		AU 8268998 A	19-01-1999
		AU 8269098 A	19-01-1999
		AU 8269198 A	19-01-1999
		WO 9900084 A	07-01-1999
		WO 9900085 A	07-01-1999
		WO 9900086 A	07-01-1999
		WO 9900087 A	07-01-1999
		WO 9900088 A	07-01-1999
		WO 9900089 A	07-01-1999
		WO 9900090 A	07-01-1999
		WO 9900091 A	07-01-1999
		WO 9900092 A	07-01-1999
WO 9817219 A	30-04-1998	AU 4655397 A	15-05-1998
US 5330459 A	19-07-1994	AT 161706 T	15-01-1998
		AU 6959094 A	17-01-1995
		CA 2165296 A	05-01-1995
		DE 69407786 D	12-02-1998
		DE 69407786 T	23-04-1998
		DK 705087 T	23-02-1998
		EP 0705087 A	10-04-1996
		ES 2111307 T	01-03-1998
		GR 3026375 T	30-06-1998
		JP 8511704 T	10-12-1996
		WO 9500090 A	05-01-1995